

A Field Trip to Singapore

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I arrived in Singapore on business to find all my equipment had been held up in customs. With little to do without it—but wait!—I quickly consoled myself by setting out to search for *Nepenthes*. Singapore has very a extensive bus network as I soon found by buying a “SBS GUIDE” (Singapore Bus System) for 70 cents Singapore. Taxis are also far more abundant than in the States so getting around didn’t seem to be a problem. The locals were very courteous and since most business was conducted in English, they spoke far more English than I did Mandarin. “What could be easier?” I thought. Well, after three days of hitting all the local gardens, a dozen nurseries, and asking everyone that would listen, several easier tasks came to mind. On the fourth day, tired and depressed, I mentioned my plight to Lim Soon Leng, an Aeronautical Engineer with whom I was working in Singapore, who thought that the Singapore Tourist Promotion Board might be able to help me.

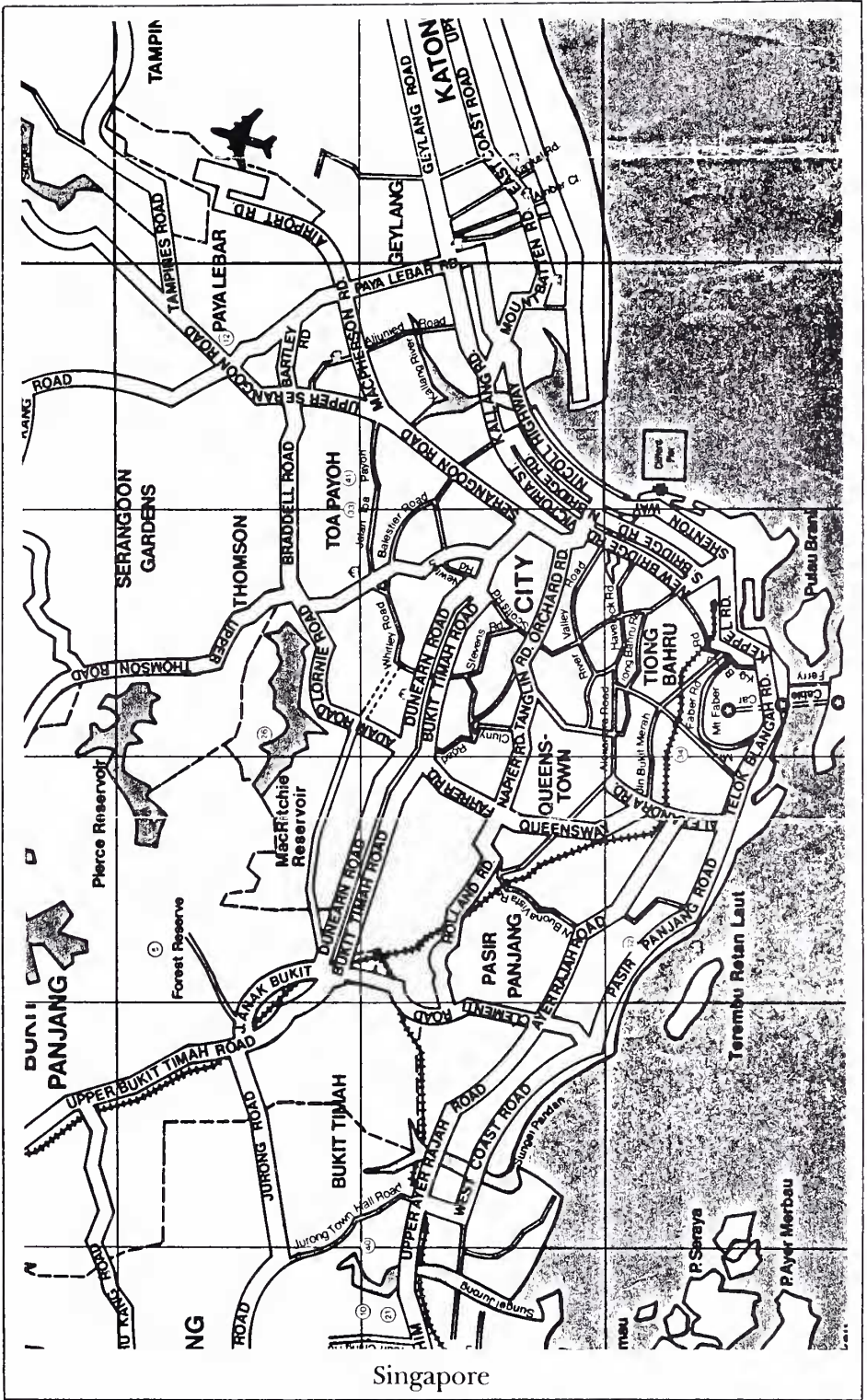
I went to the Singapore Tourist Promotion Board for help in finding *Nepenthes* or “monkey’s cup” as the locals called them and was referred to a local botanist, Thomas J. Maxwell, at the Singapore Botanical Gardens. Mr. Maxwell gave me directions to the three areas known to have *Nepenthes*; (1) Bukit Timah Nature Reserve for *N. gracillis*, *N. ampullaria*, and *N. rafflesiana*. (2) South Buona Vista Road for *N. gracillis* and *N. ampullaria*. (3) Mac Ritchie Reservoir for *N. gracillis*. Mr. Maxwell was very kind to invite me along on an expedition to Bukit Timah Reserve he had organized for several others looking to collect specimens of various plants, fungi, and insects for their studies.

We all gathered at the entrance to the Reserve the following morning. The path into the Reserve was a very steep climb of about 45 degrees. Before going 100 meters the first of our group found some-

thing and was off the path and on her own. It required several stops to catch our breaths and to recover from the high humidity before we reached the first fork in the road. As we penetrated deeper into the jungle we broke into small groups and gradually went off into different directions with each group looking for its own “treasure.”

Maxwell gave me rough directions and I was off through the jungle trails searching for any sign of *Nepenthes*. As I followed the trail I came to the edge of a cliff created by a large rock quarry that was the boundary of the Reserve. The upper edge of the cliff was covered with ferns about one meter high, clear of the large trees and in full sun. The vines of *N. gracillis* could be seen everywhere among the ferns. As I made my way off the trail through the dense vegetation I came upon a large *N. rafflesiana* one full meter high. It was a wonderful sight and to think I almost walked past it! Such a large carnivore is hard to imagine but to find that it was only a small part of a much larger plant was truly inspiring. The plant grew from the middle of a 1 cm black vine that came from under the dense ferns, lay along the ground for three meters and then went up into a tree at least ten meters high and vanished into the upper foliage! The vine could not be moved as it was firmly rooted to the ground along the entire distance. In the entire Reserve, this was the only *N. rafflesiana* that I could find. The ground was a very hard and nonporous clay with only a few centimeters of decaying humus covering the surface.

As I pushed through the ferns looking for *N. ampullaria*, the vines of *N. gracillis* could be seen everywhere. It was impossible not to damage the vines as we moved about since they were laced throughout the ferns and other foliage and took every opportunity to grow up to the sunlight.



Singapore

It was not very long before Maxwell had spotted a *Nepenthes* vine much thicker than that of *N. gracillis* among the ferns. We pushed back the ferns to discover a small cluster of *N. ampullaria* pitchers around the vine where it lay along the ground. We followed the vine back under the ferns where it lay almost completely covered by 10 cm of dead fern leaves. We exposed 1.5 meters of *N. ampullaria* vine and two more clusters of pitchers. One cluster was over 60 centimeters across. As with the *N. rafflesiana* we could not find the base of the vine. The pitchers formed clusters along the vine as it lay on the ground and were half covered by the falling debris from the ferns. The vine turned up through the ferns where the leaves could reach the sunlight. There were no pitchers on the leaves of the plant as there was with *N. rafflesiana* or *N. gracillis*. Examination of the pitchers showed them to be almost full with captured ants.

As we uncovered more clusters of *N. ampullaria*, the excitement spread to others of the group. They rushed over to examine the find and to take photographs. One fellow forgot that we were on the edge of a 100 meter cliff concealed by the dense shrub and stepped into a small crevice leading over the cliff! His fall was stopped as his outstretched arms became entangled in the vines as he went down. You could say his life was saved by a carnivorous plant! With him saved and a bit more cautious celebrating, Maxwell asked if the liquid in the pitchers could be drunk. Considering the oppressive heat and humidity it didn't seem to be a bad idea. However, I suggested that the liquid from the unopened pitchers would be much more palatable. Maxwell was the first to drink and noted that there was not much fluid to drink and that it didn't do much to quench his thirst. The low level could have been due to a dry spell Singapore had suffered for the past two months. We thought it would taste like distilled water but it didn't. It had a slight flavor that could have been due to digestive enzymes already present in the liquid.

Next, I went to the area of South Buona Vista Road that Mr. Maxwell had suggested. After catching a bus and explaining to the driver where I wished to stop, I enjoyed the scenery for about 20 minutes when someone tapped me on the shoulder and literally pushed me out! When the bus pulled away, I saw the sign for South Buona Vista Road and realized that someone had actually done me a favor. Without any delay, I started up the rural road in search of *N. ampullaria* and *N. gracillis*. The road twisted tightly up and around a hill and about 500 meters later it was quite steep on both sides of the road and covered with dense vegetation. The hillside had been stripped of all large trees several years ago in anticipation of new construction in the area but was postponed according to Mr. Maxwell and that allowed the dense undergrowth to reclaim the area more vigorously. The only remaining trees bordered the road. It was in this area that the first *Nepenthes* were found.

The first plants discovered were *N. gracillis*. They were growing on the uphill side of the road's embankment in partial shade. The soil was the same as it was at Bukit Timah, hard clay with a thin covering of humus. One cluster of vines was over a foot in diameter comprised of dozens of individual plants growing up into a tree. Most of the vines were old and dried but the younger ones (less than three meters long) had pitchers on a majority of their leaves. Several more of these large groups of *N. gracillis* vines could be found throughout the trees. It seemed that once a vine had established a path up into a tree others followed. Was it to provide an alternative route for the ants that seemed to be making their way up every tree and thus capture a good percentage of them for the plants benefit? Or, were the plants merely attempting to reach a more plentiful supply of sunlight? I was amazed at the number of variations in the pitchers in this small area. Some were entirely green, others were dark crimson, still others were half and half. Some resembled *N.*



Cluster of ground pitchers of *N. ampullaria*.

Photo by M. Woodring

alata and others resembled *N. thorelii*. The largest pitchers were 15 cm and the vines were impossible to measure but I would guess they were over 10 meters long. Was I looking at more than one pitcher, I discovered a small red crab-shaped spider apparently unaffected by the fluid and able to move about without any difficulty on the sides of the pitcher. It did not appear to be trapped and there was no evidence of any other insects trapped by the plant within the pitcher. Had the pitcher failed to capture any insects, or did the spider remove those that the plant had caught?

Soon I came upon *N. ampullaria* in a very shaded location in a crevice eroded by water. There were a lot of dead leaves trapped by the plants as they were washed down the crevice. The pitchers were comprised of small clusters sprouting from the main vine at the base of an old leaf. Each cluster may or may not have leaves apparently depending on whether or not that cluster was buried under the debris or in contact with the sunlight. I could find only this one *N. ampullaria*. It was much smaller than the sprawling vines at the Reserve and had a deep green color

rather than a speckled yellow-green.

Finally, I went to MacRitchie Reservoir. It was one of the main supplies of fresh water for Singapore. After searching for some time around the perimeter of the Reservoir and in throughout the bush, I started back toward the entrance without any luck. Following one of the footpaths used by local joggers, I noticed a *Nepenthes* vine entangled in a bush down a steep embankment right next to the water's edge. It was impossible to reach the plants without falling into the water below. Perhaps that is why the plants were unmolested. Again, there seemed to be more than one species here. This time however, I noticed the leaves were also slightly different. The plant that most strongly resembled *N. gracillis* had thinner and more fragile leaves; the other had much more robust ones. The largest of the *N. gracillis* pitchers were found here: 15 cm for living traps and approximately 18 cm for dried traps found on the plants. This also was the only *Nepenthes* found in flower. Both male and female flowers were visible at one time. I was unable to get any closer and gather samples of the flowers or pitchers.